

1.115.812



# PATENT SPECIFICATION

DRAWINGS ATTACHED

1.115.812

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## COMPLETE SPECIFICATION

### Arrangement for Locking a Shank Tool in a Holder

We, COAL INDUSTRY (PATENTS) LIMITED, a Company organised in accordance with the Laws of Great Britain of Hobart House, Grosvenor Place, London, S.W.1, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an arrangement for locking a shanked tool in a tool holder and in particular to the locking of shanked tools in tool holders of machines having a rotatable cutter unit carrying a number of mineral cutting tools or picks.

In our co-pending application No. 14089/63 (Serial No. 1,098,561) we have disclosed a rotary cutter unit for a longwall mineral mining machine which comprises a framework adapted to support fewer than fifteen holders for cutting tools i.e. picks, the holders being so positioned that the cutting edges of the tools lie on the curved surface of a cylinder with the holders arranged in the form of one or more helices. Since less than 15 tools are used they are relatively widely spaced on the rotary cutter unit, as compared with previously known mineral mining machine rotary cutter units. Hence the tools are each considerably larger than the hitherto conventionally used tools. In practice these tools have a breadth in frontal aspect several times greater than conventional mineral mining cutter tools and may be from 1 inch to 3 inches wide and of spade or generally rectangular form seen in front elevation, with the shank of the tool either of circular or rectangular cross-section.

In view of the considerable increase in such mineral mining cutter tool dimensions, the weight of the tool and the forces generated on the tool during use are considerably increased, and the tendency for the tool to work loose in the tool holder is increased. It is thus

necessary to ensure that the tool is very firmly secured onto the tool holder.

It is an object of the invention to provide an arrangement for locking the shank of a tool in a recess formed in a tool holder and particularly means for holding a mineral cutting tool in a rotary cutter unit.

A first aspect of the invention provides an arrangement for locking the shank of a tool in a recess formed in a tool holder, wherein a retaining pin having a head portion and a shank portion co-axial therewith, the shank portion being adapted to engage two aligned bores in the tool holder and a through bore in the tool shank when the shank is in the tool holder, the pin shank portion being an easy clearance fit in said bores and wherein when the tool shank is in the holder the bore therein is slightly off-set from the other bores, the arrangement being such that introducing the pin into the bores it is deformed so as to exert restraining forces on the tool which retain the tool in the holder and the pin in the bores.

Accordingly a further aspect of the invention provides an arrangement for locking a tool having a shank into a holding means adapted to receive the shank, the arrangement comprising a pin having a head portion and a body portion of a smaller cross-section than that of the head portion and co-axial therewith, the join between the head and body portions being tapered, a first bore extending through a wall of the holding means, the first bore being a clearance fit for the pin head portion, a second bore in an opposite wall of the holding means and adapted to provide a clearance fit for the pin body portion, and a through third bore in the shank which defines a clearance fit with respect to the pin body portion, the axis of the third bore and at least one of the other bores being relatively slightly offset, the arrangement being such that on causing the pin

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to engage with all three bores the shank portion of the pin is distorted with respect to the head portion in such manner as to urge the tool shank further into the holding means.

- 5 Preferably the first and second bores are co-axial and the axis of the third bore is parallel to but axially offset from the common axis of the first and second bores.

- 10 Reference will now be made to the drawing accompanying the Provisional Specification in which:—

- 15 Figure 1 is a diagrammatic side elevation of a tool holder and a cutter tool which is securable in the tool holder by the locking means according to the invention,

- 20 Figure 2 is a diagrammatic sectional view of details of Figure 1 to an enlarged scale indicating the relative positional relationship between the pin location bores in the tool and holding means,

Figure 3 is the same as Figure 2 but additionally shows the pin partially driven into the shank and holding means and

- 25 Figure 4 is the same as Figure 2 but additionally shows the pin fully driven into position.

- 30 In Figure 1, a tool 1, i.e. a pick, having a body portion 2 and a shank 3 is shown positioned in the tool holder 4 carried upon a cutter unit drum 5 (only a fragment of the drum being shown). The tool has a tungsten carbide tip 6. This tool is described in greater detail in the co-pending application No. 14089/63 (Serial No. 1,098,561).

- 35 A through bore 7 is formed in the tool shank 3. The axis of the bore 7 is perpendicular to and intersects the longitudinal axis of the shank.

- 40 Through bores 8 and 9 are formed in opposite side walls of the tool holder, these bores being co-axial. The diameter of the bore 8 is greater than that of the bore 9. The diameter of the smaller bore 9 is substantially the same as that of the bore 7 in the shank.

- 45 The bore 7 in the shank is so located thereon that when the shank is inserted into the holder the axis of the bores 7, 8, 9 lie in a plane containing the longitudinal axis of the shank 3 with the axis of the shank bore slightly axially off-set, for example about 1/32 of an inch, in the direction towards the tool head relative to the axis of the bores 8 and 9.

- 50 A pin 10 has a head 11 with a diameter which is an easy force to slight clearance fit on the bore 8, and a body 12 with a diameter which is a clearance to easy force fit with respect to the shank bore 7 and the smaller bore 9. The join between the pin head and body is tapered to avoid a sharp step at the join.

- 60 On introducing the pin 10 into the bores the following sequence of events occur. The pin body 12 passes readily through the larger bore 8 and into the shank bore 7 since the pin diameter is considerably less than that of the bore 8. The pin axis at this stage aligns

with that of the shank bore 7. As soon as the pin end 13 traverses the shank bore 7 it abuts the inner edge of rim 14 of the smaller bore 9. At this stage increase driving force has to be applied to the pin to distort and deflect the pin end 13 downwards into the mouth of the smaller bore 9. Meanwhile a tapered part 15 of the pin head adjacent the pin body engages with the large bore 8, the tapered part 15 on the pin acting as a guide, which leads the head 11 into the bore 8. On further driving of the pin the pin body is deformed by reason of the shank bore 7 being offset relative to the tool holder bores, this being shown in Figure 3. The deformation of the pin produces a considerable force which urges the tool to seat tightly within the holder 4 and which also locks the pin 10 in position in the three bores 7, 8 and 9.

The pin head is provided with a shoulder 16 to prevent the pin from being driven in too far. The pin head has also a larger diameter portion defining a shoulder 17 which provides abutment surfaces for engagement by an extraction tool.

To remove the pin the extractor tool (not shown) is engaged with the shoulder 17 and with the adjacent surface of the holder and an axial force applied to the pin. As soon as the head 11 disengages from the bore 8 the pin 10 is substantially freed from the tool holder 4 after which the pin can be readily removed and thence the tool 1 can be removed from the tool holder.

#### WHAT WE CLAIM IS:—

1. An arrangement for locking the shank of a tool in a recess formed in a tool holder wherein a retaining pin having a head portion and a shank portion co-axial therewith, the shank portion is being adapted to engage two aligned bores in the tool holder and a through bore in the tool shank when the shank is in the tool holder, the pin shank portion being an easy clearance fit in such bores, and wherein when the tool shank is in the holder the bore therein is slightly offset from the other bores, the arrangement being such that on introducing the pin into the bores it is deformed so as to exert restraining forces on the tool which retain the tool in the holder and the pin in the bores.

2. An arrangement for locking a tool having a shank into a holding means adapted to receive the shank, the arrangement comprising a pin having a head portion and a body portion of a smaller cross-section than that of the head portion and co-axial therewith, the join between the head and body portions being tapered, a first bore extending through a wall of the holding means, the first bore being a clearance fit for the pin head portion, a second bore in an opposite wall of the holding means and adapted to provide a clearance fit for the pin body portion, and a through third bore in the shank which defines a clearance fit with

- 5 respect to the pin body portion, the axis of the third bore and at least one of the other bores being relatively slightly offset, the arrangement being such that on causing the pin to engage with all three bores the shank of the pin is distorted with respect to the head portion in such manner as to urge the tool shank further into the holding means.
- 10 3. An arrangement as claimed in claim 1, wherein the first and second bores are co-axial and the third bore is parallel to but axially offset from the common axis of the first and second bores.
4. An arrangement for locking a tool having a shank into a holding means, substantially as hereinbefore described with reference to and as illustrated in the drawings accompanying the Provisional Specification. 15

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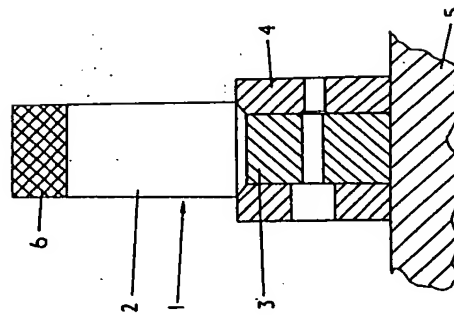


FIG. 1.

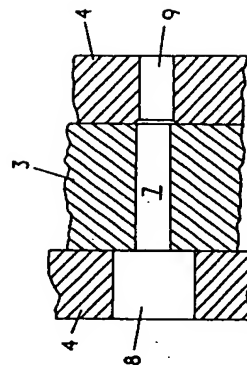


FIG. 2.

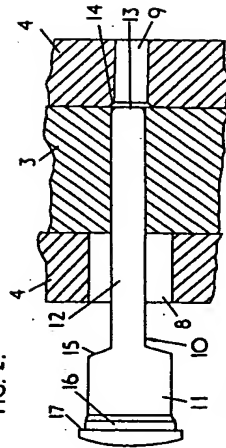


FIG. 3.

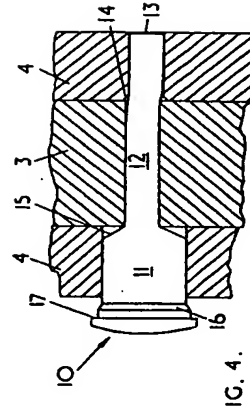


FIG. 4.

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